Journal of Geography

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/rjog20>

The Delta of the Mississippi

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Published online: 12 May 2008.

To cite this article: Francis E. Lloyd (1904) The Delta of the Mississippi, Journal of Geography, 3:5, 204-213, DOI: [10.1080/00221340408985502](https://doi.org/10.1080/00221340408985502)

To link to this article: <http://dx.doi.org/10.1080/00221340408985502>

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THE DELTA OF THE MISSISSIPPI *

BY FRANCIS E. LLOYD

Professor of Botany, Teachers College, Columbia University

DURING the summer of 1900 I undertook a trip to the Delta of the Mississippi River and the islands which lie to the eastward, for the purpose, primarily, of studying the vegetation of that bit of country. Though but a very amateur in matters of geography, I have to confess that my interest in the Delta well-nigh eclipsed my more immediate interest in its plants, until, at least, my mind regained its equilibrium. I shall in the present paper attempt to give an account of my observations of this interesting region, having reference chiefly to that portion commonly known as the Delta, and not to that larger area bordering the lower Mississippi, which in recent geological times has been built up by the same processes which may now be seen in operation in the Delta itself. (See Map 1.)

The only practical way of exploring such a region is by means of a boat of light draft. The waterways, though tortuous, are continuous and the water, for a very considerable distance from the land, shallow.

*For folding map of the Delta of the Mississippi see inside front cover.

For this reason the party of which I was a member hired a "scow schooner," ordinarily used for oystering. This is the finest kind of craft for knocking about such waters. Roomy, unpainted, stiff, drawing little water, one can creep into the veriest bits of mudholes, and *get out again*; being roughly built and no better finished, a naturalist has to take no precautions for the preservation of appearances; and being roomy, there is plenty of space to sleep on the deck, under mosquito netting, and thus be cool at night. A few weeks' cruise on such a boat is an ideal experience.

On approaching the Delta from the east, with still a wide expanse of water ahead, and in the distance the low stretch of green marsh and a curious, jagged sky-line of willows, reaching far to the north, one will, perhaps, receive a suddenly applied demonstration that the land is not so far off as it seems. In a word, the boat is aground. Instinctively, she is headed up to the wind, if possible, and all hands jump overboard, a most comical procedure that never fails to evoke laughter and remarks from one's companions. In this concrete way we learn that beneath the mud-laden water the bottom extends out to sea for many miles at a depth of two or three feet, and less in places. Such an experience demonstrates to us what the great river is doing. Its water, opaque with sediment, carries most of this over the shallow, submerged extension of the Delta. Some of it, however, gradually settles to the bottom, and thus slowly raises the level of the sea floor, while the rest of the detritus is precipitated farther seaward. Deeper channels in this platform are eroded by the currents, which extend out from the various mouths of the river. Low, submerged mounds are formed by eddies, and the whole vertical contour is modified from time to time by storms. The constant change makes navigation especially dangerous. You are compelled literally to feel your way along, even in a small "scow," by means of an oar, a man on each bow calling off the depth in feet and inches. It is only by the submerged channel formed by the South Pass current that approach may be had by ocean-going vessels, and this calls for skilled pilotage.

From a considerable distance the Delta appears as a very low extent of land, with even, horizontal contour. The color is a uniform dark green, the whole landscape being somber and monotonous, especially in the failing light of evening. The impression of the contour, however, is deceptive, for a closer approach shows that the land is broken up into a maze of bays, "cut-offs," and lagoons, forming necks of land and islands of all sizes and shapes. An adequate notion of

FIG. 2. *A view looking east of south from the top of the South Pass Lighthouse. The white oblique line is a board footpath to a boat mooring. The dark line parallel to the horizon is a sand spit extending westerly from the mouth of the river.*

the complexity of the land forms may best be had by getting a view from a point of vantage at the top of the South Pass Lighthouse. Such a view is seen in the second figure and no further word of description is necessary. How this horizontal contour is brought about is to be explained, at least in part, by the secondary action of the waters outside of the Delta. Were it not for the tidal action and the effects of wind and currents, the Delta would be built up regularly, as is suggested by the more even contour line of its submerged portion. But, given these factors and a soft, homogeneous, flat, low-lying alluvial deposit to work upon, together with occasional unevenness, due to buried or partly buried detritus of small and large pieces of tree trunks, branches, and the like, which float down the river and are deposited, we can easily understand how the irregularities of contour arise. These help to direct the erosive forces, and thus are a factor in producing the result above described.

Our entrance to the Delta was made through Cubit's Gap on its eastern side. This is the main channel of a secondary delta, caused, at some period of extraordinary flood, by the main current breaking through its low-lying bank at a weak point. The lateral stream thus originated will in time build up a form similar to, but smaller than, the chief delta. At occasional points along the shore are encountered fishermen's houses, built on the low-lying marshes. Their situation is precarious, because the muddy surface is frequently submerged, and the run of rough water during storms is sometimes disastrous. The danger is

reduced by building upon long spiles, which lift the house above the surface. The experience of entering such a dwelling is certainly novel. The fisherfolk are chiefly Italians, who are very hospitable. Their boats are single-masted luggers of light draft, well built and graceful.

Upon entering the main stream of the Mississippi, we follow the stream in its southeasterly course. At once the appearance of our surroundings changes. A few minutes previously a whole sea was behind us, and the feeling we experienced was that of approaching the land. Now it seems as if we are floating on a river inland, its banks clothed with a tall grass (*Phragmites*), or "canes," as they are locally called, which shut out the distant view. (Fig. 3.) Trees of black willow, which form a continuous growth farther up stream, are to be seen occasionally along the bank, and the "canes" are often overgrown by a species of ampelopsis (*Ampelopsis arborea*), but more frequently and densely by a leguminous vine (*Vigna glabra*), bearing numerous yellow, pea-like flowers. Of these plants, the "cane" is the most interesting, for its growth contributes very materially to the stability of the muddy bank. It spreads by runners, some of which project out into the stream, extending downward with the current as much as thirty meters or more. Those which take root contribute to the formation of hummocks, which, by their close juxtaposition, make a firm framework to support the soft materials of the bank.

FIG. 3. A view of the river bank of the South Pass showing the dense growth of canes (*Phragmites*.)

From the western bank of this part of the Delta stretch considerable reaches of low, swampy meadow land, clothed with grasses and weedy plants, among which a sensitive plant (*Mimosa strigillosa*) is very common, and responds rapidly to the touch by closing tightly its leaflets and bending down its leaves.

Continuing the course down stream, we come suddenly to a parting of the way in three directions—quite the reverse of the ordinary experience in floating down stream. Instead of the tributaries feeding the stream, the stream divides its water among its distributaries (here the three main Passes) of which the middle, in line with the chief stream, is the South Pass, and the way we chose. Once well into this arm of the river, the most illuminating evidence of the work of the great river is before us.

If we climb the bank in this region, we can look beyond a few hundred feet out upon an expanse of salt water. (Fig. 4.) The highest part of this land is beneath us, only a few feet above the level of the swiftly-running stream, and an equal distance from it. This low ridge is a lateral barrier, built up from the sediment of the river laid down at times of flooding, and allowed to maintain a level above that of the sea level. In this manner a natural aqueduct of the stream's own making guides it to its mouth. From the ridge, the bank slopes more

FIG. 4. A view looking north along the western bank of the South Pass. On the right one sees the back-bay waters, and the low, flat marsh contiguous to them. The highest ground, near the river, is indicated by the willow. Note the slope of the ground on the left of the ridge, and the sudden fall on the right. In the foreground part of a fisherman's house, and of the "scow schooner" mentioned in the text. The fisherman's houses are always built on stilts to protect them from floods.

FIG. 5. South Pass, from the lighthouse, looking north. Note the river flowing between the narrow, irregular strips of land. The picture shows an outgoing steamship.

gradually away toward the salt water. The canes of the higher level give way to a lower, stiff-leaved grass (*Spartina*). As one walks through this bristling foliage, thousands of small amphibious crabs scurry in all directions. It is in such low-lying, densely grassy places that the alligator builds its nest, consisting of a mass of dead grass packed about the eggs, which are laid in considerable numbers.

At the mouth of the South Pass is the small village and Government station of Port Eads, the seat of the jetty operations. The effort of the engineers who are managing these operations are so to control and direct the stream as to keep a ship channel open up to and above the mouth. This involves a vigilance as eternal as the stream itself. From the top of the South Pass Lighthouse may be had a most instructive panoramic view. In Figure 2, which is a view looking seaward, besides the details referred to above, we see in the distance a long, slender spit, which is formed by the deposit brought about by the influence of the still "back-bay" waters upon the moving waters on the outside. This narrow stretch of land outlines most perfectly the ideal form of the Delta. In the map (Map 1, Fig. 1) this is seen on the western side of the mouth.

Looking north we see the South Pass with a vessel on its surface, and the irregular and, at times, very narrow strip of land which walls in the current.

Once outside, and we bear northeasterly to pass around the N. E. Pass on our return to our "port of departure." After passing out of the ship channel, we are again in shallow water until we cross the channels extending from the other mouths, in the vicinity of which there are large numbers of very curious islands, all nameless, well termed collectively the "mud lumps." They consist of a very compact black or yellowish clay, overlaid with a thin top soil. In size they vary from a few square rods to perhaps fifty acres, and their surface is three to

nine feet above sea level. They appear to have an origin quite different from the other islands—for their topography suggests very strongly that they have been erupted from below the surface of the water. I can not say, however, that this is true. The vegetation of these dreary spots is sparse, and weedy in character. The lack of natural charm is emphasized by the frequent abundance of flies, which buzz about one in a most threatening manner and bite viciously. One very interesting little plant we found, which evidently had been brought down the stream—a little floating fern, *Azolla Caroliniana*. This was growing in a little cove of a mud lump near Pass á Loutre. On islands near by we found immense flocks of pelicans.

After leaving the North Pass we sail northwesterly for Bird Island, a long, slender strip of alluvium overlaid on the seaward side by sand in sufficient quantities to be heaped up by the wind into small beach dunes. Here we find the beautiful sea oats, *Uniola paniculata*, which add a strikingly graceful element to the otherwise monotonous grassy, beach dune vegetation.

The most important grass is *Panicum amarum*, since it is a sand binder, and is largely responsible for the topography of the beach dunes, which are found at the limit of ordinary wave action. (Fig. 6.) Growing chiefly at this point we find the common tropical beach convolvulus, *Ipomoea pes-caprae*, so called on account of the resemblance of the leaf to the hoof of a goat. The runners of this plant attain a length of 120 meters on the Florida strand, although the longest I found in the Delta region were only a fourth as long. The plant has fine reddish-purple flowers, seen in their beauty only in early morning. There is another similar plant, found in Breton Island, with lobed leaves and white flowers.

Bird Island serves as a type of many other islands, such as Breton Island and Cat Island, in that the foundation is alluvium. Overlying this, on the seaward side, which is also the windward side with respect to the prevailing wind, is a layer of sand, more or less deep, according to the size of the island. On the largest, enough is present for the making of large dunes, in the lee of which stretches of sandy plains are found. On these islands the vegetation is composed of pine trees and palmettos, and is very similar to the vegetation of the coastal plain of the mainland.

One other type of island remains to be mentioned, of which there are many examples on our course from Bird Island to Cat Island, west of Chandeleur Sound. They are similar in origin to the sandy islands, but are peculiar in the circumstance that the sand is absent and small shell

FIG. 6. The Beach Dunes formed by a coarse, gray-green grass (*Panicum Amarum*). Two species of beach morning-glory are to be seen creeping over the sand.

FIG. 7. A "shell-dune," with its very sparse, weedy vegetation. On the right is the muck marsh with its uniform clothing of a succulent (*Batis Maritima*).

fragments take its place. (Fig. 7.) They are therefore appropriately called "shell islands." The shells are always found forming a continuous narrow dune on the seaward edge of the island, quite parallel and adjacent to the very narrow, muddy beach. (Fig. 8.) The remaining flat, muddy, and marshy surface supports a growth of low succulent plants (*Salicornia* and *Batis*), and, less frequently, of the white mangrove (*Avicennia nitida*), which is here at its northern limit. This plant is very interesting on account of its air roots, which project upward out of the mud, and enable the plant to respire. For a similar purpose, the other succulent plants have corky outgrowths on their lower parts.

The shell dunes, on the other hand, produce a wholly different and very scant weedy vegetation of amaranths, goose-foots, some trailing vines, euphorbias, and the like. (Fig. 7.)

The shallow waters of all the islands are very productive of oysters, shrimp, and small fish. The latter are caught by means of a "cast

FIG. 8. An ideal section of a small island with a shell-dune on the windward shore. The form of the dune as seen in transverse section indicates the direction in which it is moved by the surf.

net," a circular net, which, when thrown with skill, brings death to dozens of mullet or thousands of shrimp. This form of net is especially adapted to shallow waters, although it is used also throughout the West Indies. I am told that it is found in the Nile delta also, and I have seen it on the Rhine.

One of the most unique experiences I ever had was on a dark night at Breton Island. Taking the skiff, with the purpose of throwing the

FIG 9. *Another form of a shell-dune.*

cast net, we saw, as we rowed, thousands of phosphorescent streaks of light shooting hither and thither through the water, like comets in a black sky. It was almost beyond belief, but all caused by the sudden scurry of mullet as the boat frightened them by its approach.

The limit of space has prevented a more detailed account of what we saw upon this delightful and instructive trip. I have tried, however, to bring out the salient features of our experiences of three weeks, which will never be forgotten. We were fortunate in landing at Biloxi, Miss., just in time to escape the terrors of the storm which laid waste the city of Galveston.

THE MOTIONS OF THE EARTH*

PART II

BY FOREST R. MOULTON

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THE REVOLUTION OF THE EARTH

THE question of the revolution of the earth around the sun is quite distinct from that of its rotation on its axis, some of the ancient philosophers having held to one theory and not to the other. Aristarchus (310–250 B. C.) was the first to systematically develop the heliocentric theory, that is, to explain celestial phenomena by supposing that the earth and planets revolve around the sun. He could give no proofs of its correctness and it was quite generally abandoned. The most celebrated astronomical work of the ancients was the *Almagest* of Ptolemy (100–170 A. D.) which dominated this field of science for fourteen centuries. Ptolemy showed in it that all the

*Continued from *THE JOURNAL OF GEOGRAPHY*, April, Volume III, No. 4, p. 150.